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VIA HAND DELIVERY

Ms. Magalie Romas Salas
Secretary
Federal Communications Commission
The Portals
445 12th Street, S.W.
Washington, D.C. 20554

Re: **Notification of *Ex Parte* Presentation in
File No. SAT-LOA-19990108-00007, ET Docket No. 98-206**

Dear Ms. Salas:

On February 8, 2000, representatives of Virtual Geosatellite, L.L.C. ("Virtual Geo") met with Commissioner Harold Furchtgott-Roth and the Commissioner's Legal Advisor, Bryan N. Tramont, on matters pertaining to Virtual Geo's above-referenced application and the above-referenced rulemaking proceeding. Representing Virtual Geo were Gerald Helman, Jay Brosius, and the undersigned.

Virtual Geo's presentation concerned the manner in which the proposed Virtual Geo satellite system, known as "Virgo," would utilize fixed-satellite service spectrum on a shared basis with geostationary, non-geostationary, and terrestrial systems. Virtual Geo also discussed related matters pertaining to the policy decisions to be taken in the Commission's Ku-band rulemaking proceeding in ET Docket No. 98-206, along with associated matters relating to Virtual Geo's pending petition for rule making concerning use of C-band spectrum for non-

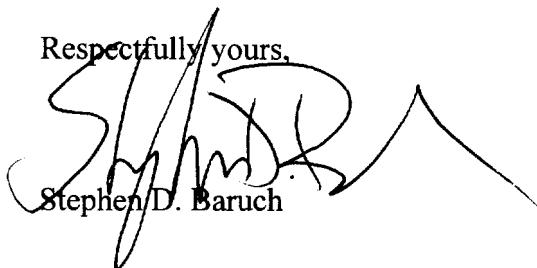
OK

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Ms. Magalie Romas Salas
February 8, 2000
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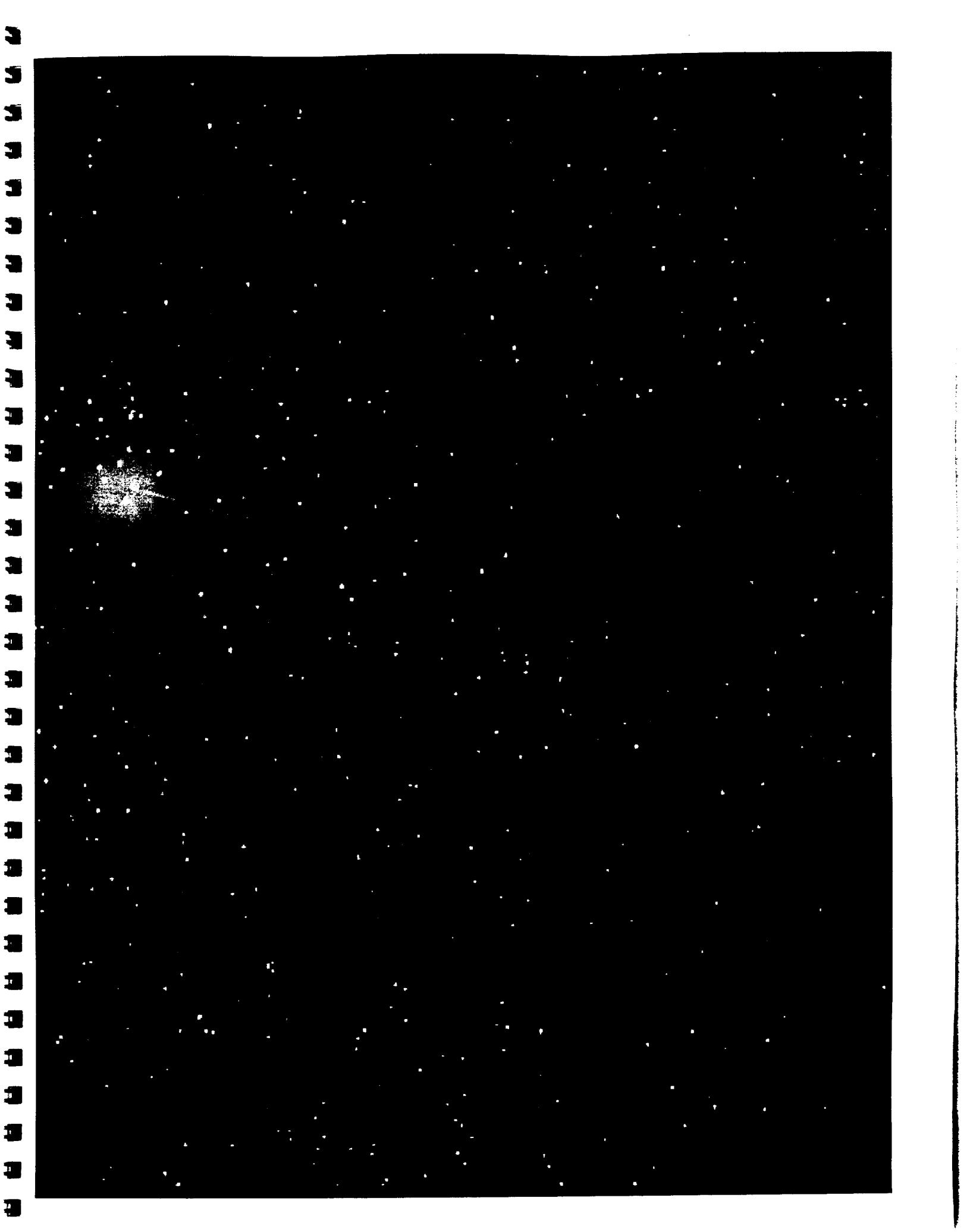
geostationary fixed-satellite service systems. The presentation of which a copy is enclosed was given at this meeting.

Please contact me if there are any questions.

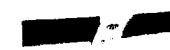
Respectfully yours,

Stephen D. Baruch

Enclosure

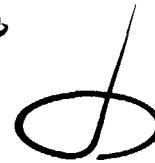
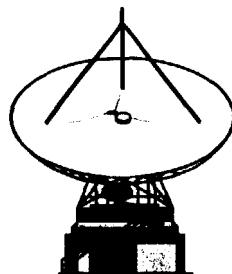
cc (w/encl.): Honorable Harold Furchtgott-Roth
Bryan N. Tramont, Esq.



Virtual Geo



- A global space-based networking and internet access service
- Using a patented* NGSO elliptical constellation of satellites
 - to optimize coverage of continental land masses, and
 - to minimize interference to other services in the band
- Supports:
 - High speed, multi-megabit per second digital traffic and applications
 - Modest sized user terminals (18" antennas)
 - Locations anywhere on the Globe

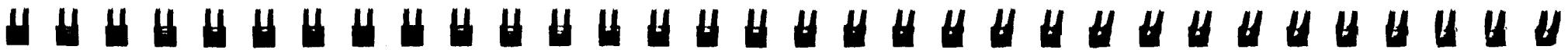


virtual geo

*patent no's 5,845,206; 5,957,409; and others pending

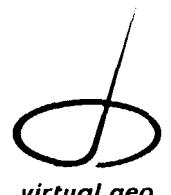
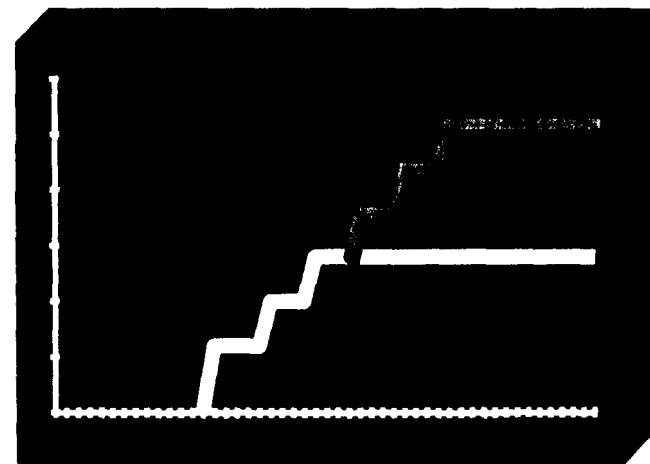
Virtual Geo's Unique Features

- Optimizes service over continental land masses
- Provides pole to pole global coverage
- Location-independent high speed digital access
- Avoids assignment and coordination complications by reusing FSS spectrum well below existing or proposed interference criteria



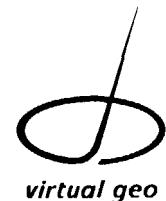
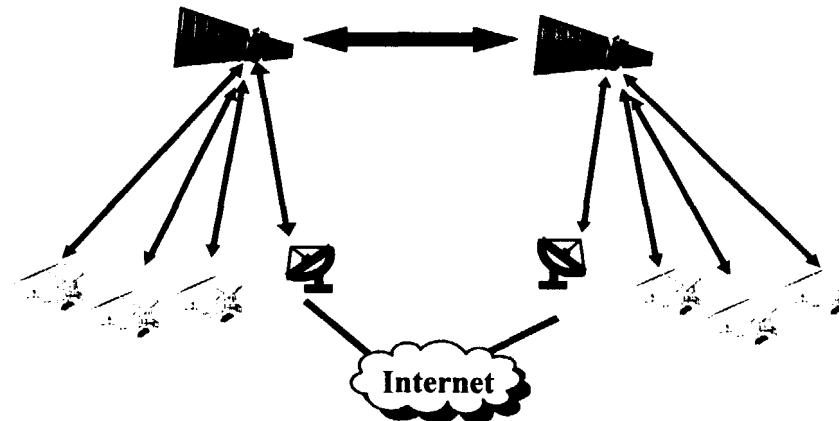
Incremental Deployment

- Instant global coverage with 5 satellites
 - 15 Gbps over the Northern Hemisphere,
 - ~ Cost of a transoceanic fiber-optic cable.
- Phased deployment of 3 sub-constellations
 - follow market demand and
 - reduce market risk.
- Deployment stages:
 - 1: AURORA I, Northern Hemisphere,
 - 2 (or 3): AURORA II, 2nd Northern Hemisphere ground track,
 - 3 (or 2): AUSTRALIS, Southern Hemisphere, completes global coverage.



Fast & Immediate Access

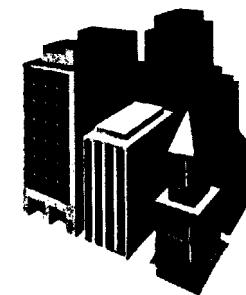
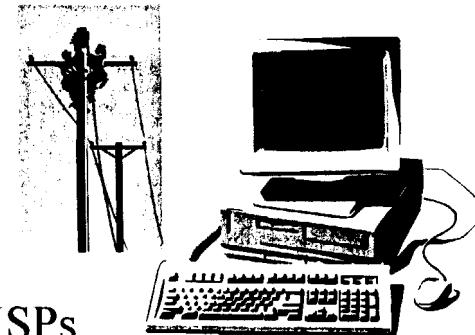
- Service beyond fiber for connectivity to and from anywhere in the world:
 - Not limited to selective point to point routes.
 - Worldwide contiguous coverage to customers who cannot be served economically by terrestrial systems.
- Immediate access: no waiting for the terrestrial buildup
- Bandwidth-on-demand.
- End-to-end solutions.



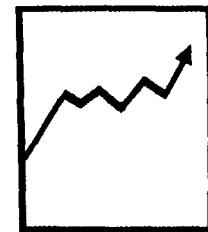
Multiple Markets

- Three primary customer targets:

- **Broadband Carriers** such as telecom carriers and ISPs requiring high-speed trunks from and to any place on earth.
- **Corporate and Institutional Networks** requiring bandwidth-on-demand and direct-to-user services.
- **Small Offices-Home Offices**, Small and Medium Enterprises, and Households will be offered the VIRGO Powered-PCTV suite of services.



DEMAND FOR BROADBAND TRAFFIC



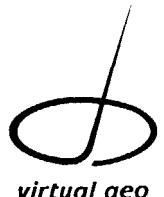
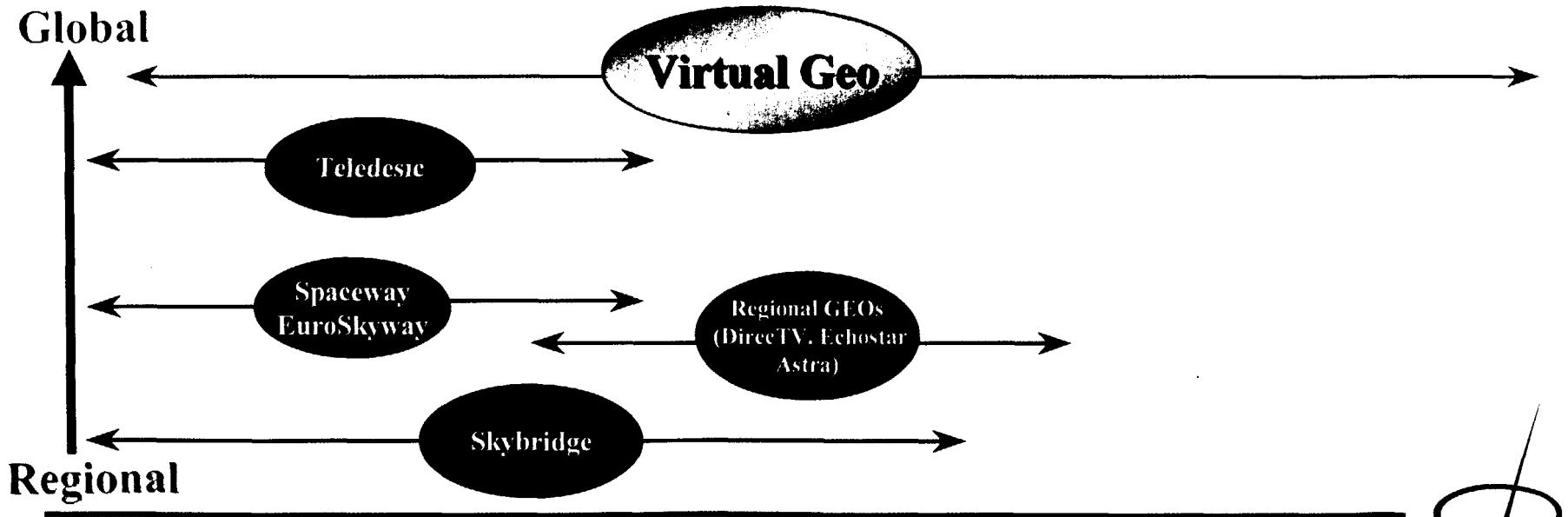
- Internet/multimedia traffic is expected to grow much faster than users:
 - Increasingly multimedia-intensive content
 - With new broadband applications.
 - Traffic 25 times larger in 2002 than in 1998
 - continues to grow at a 20% CAGR over the next decade.
 - Data/multimedia 85% of total traffic by 2002
 - v.s. 50% in 1998.
- Half of Internet/multimedia traffic will remain international,
 - Growth in non-US users counterbalances the growth in national servers
 - Less US-centric Internet traffic.

Sources: Goldman Sachs, Morgan Stanley Dean Witter, SpiNet

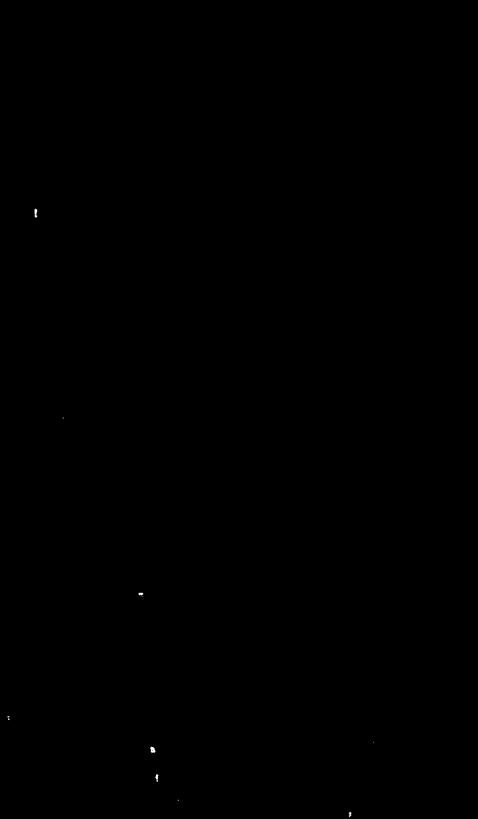
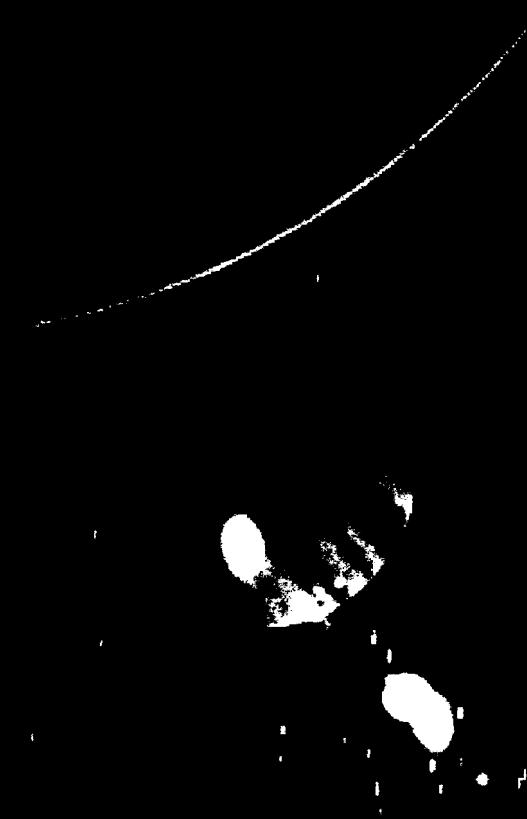
VIRTUAL GEO POSITIONING

- VIRTUAL GEO is designed to serve efficiently three primary broadband markets.
- Planned satellite systems will coexist to serve the unmet broadband demand.

CTA	CIN	Direc2U	On Demand Video
Carriers & ISPs <ul style="list-style-type: none">• Trunking• Multicasting and Caching• Terrestrial Backup	Corporate & Institutional Networks <ul style="list-style-type: none">• Bandwidth-on-Demand• Universal, Single Hop, Direct-to-User Coverage	Small Offices & Households <ul style="list-style-type: none">• Always-on Online Access• Interactive Bandwidth on Demand• Video Broadcasting	In-Home TV <ul style="list-style-type: none">• Available Anytime• TV on Demand• Video Broadcasting



Virtual Geo's Constellation

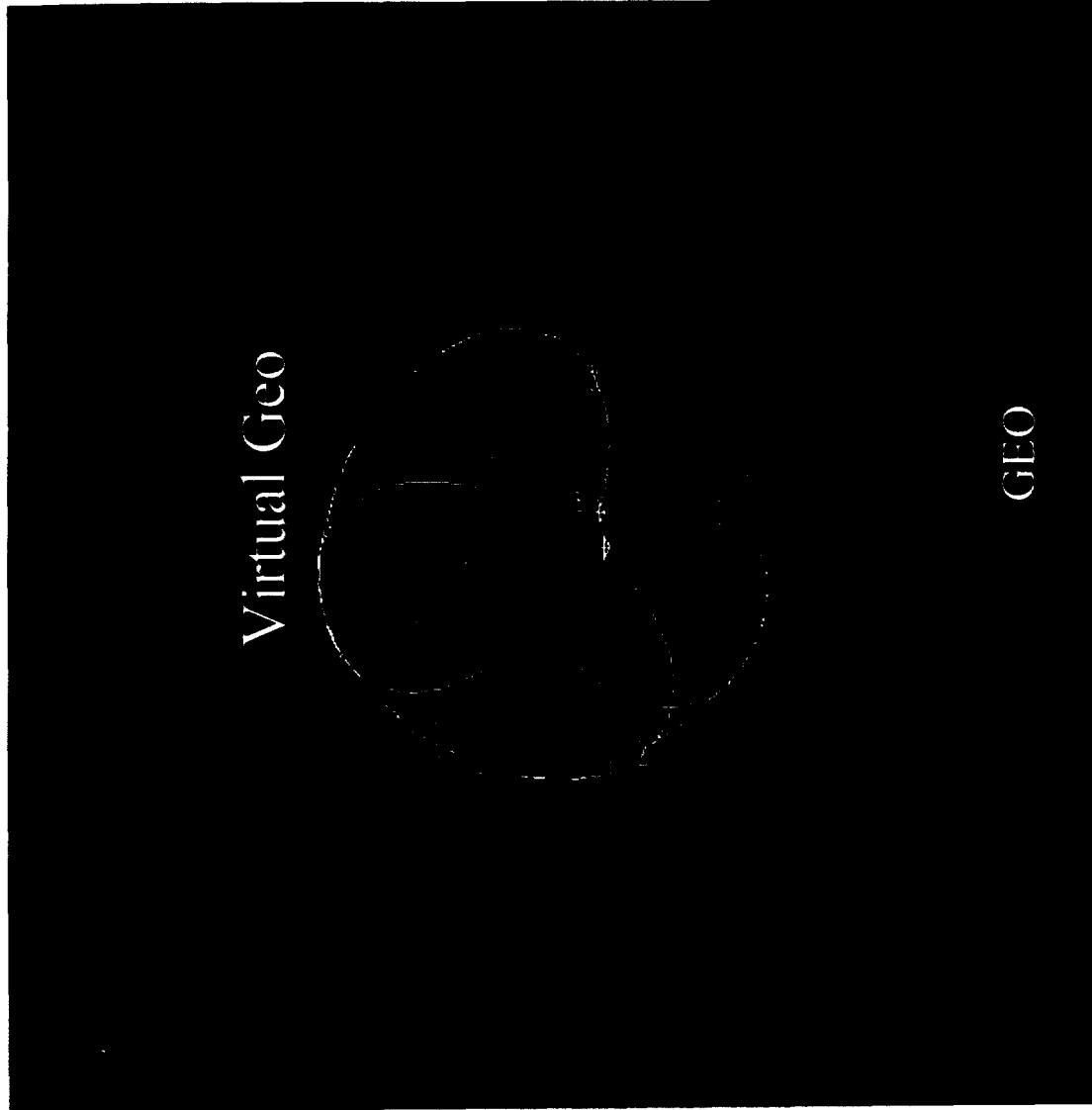


Orbits

- General
 - 15 Satellites:
 - 3 ground tracks of 5 each
 - Spares
 - One available to each ground track
 - 8 hour elliptical, critically inclined orbits, 1 plane per satellite

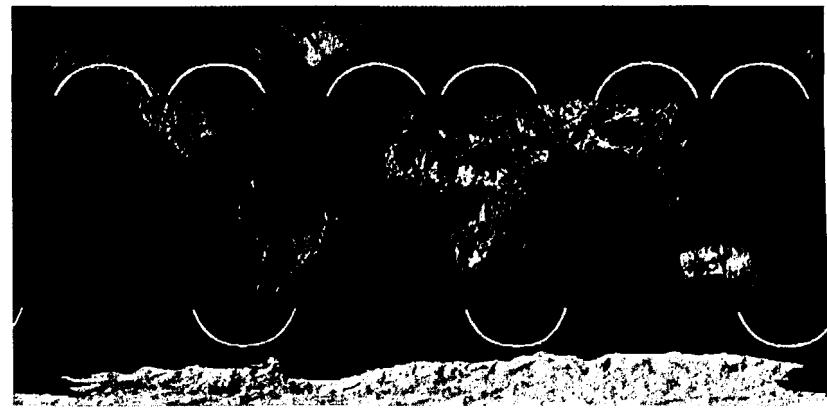


Virtual Geo from the North

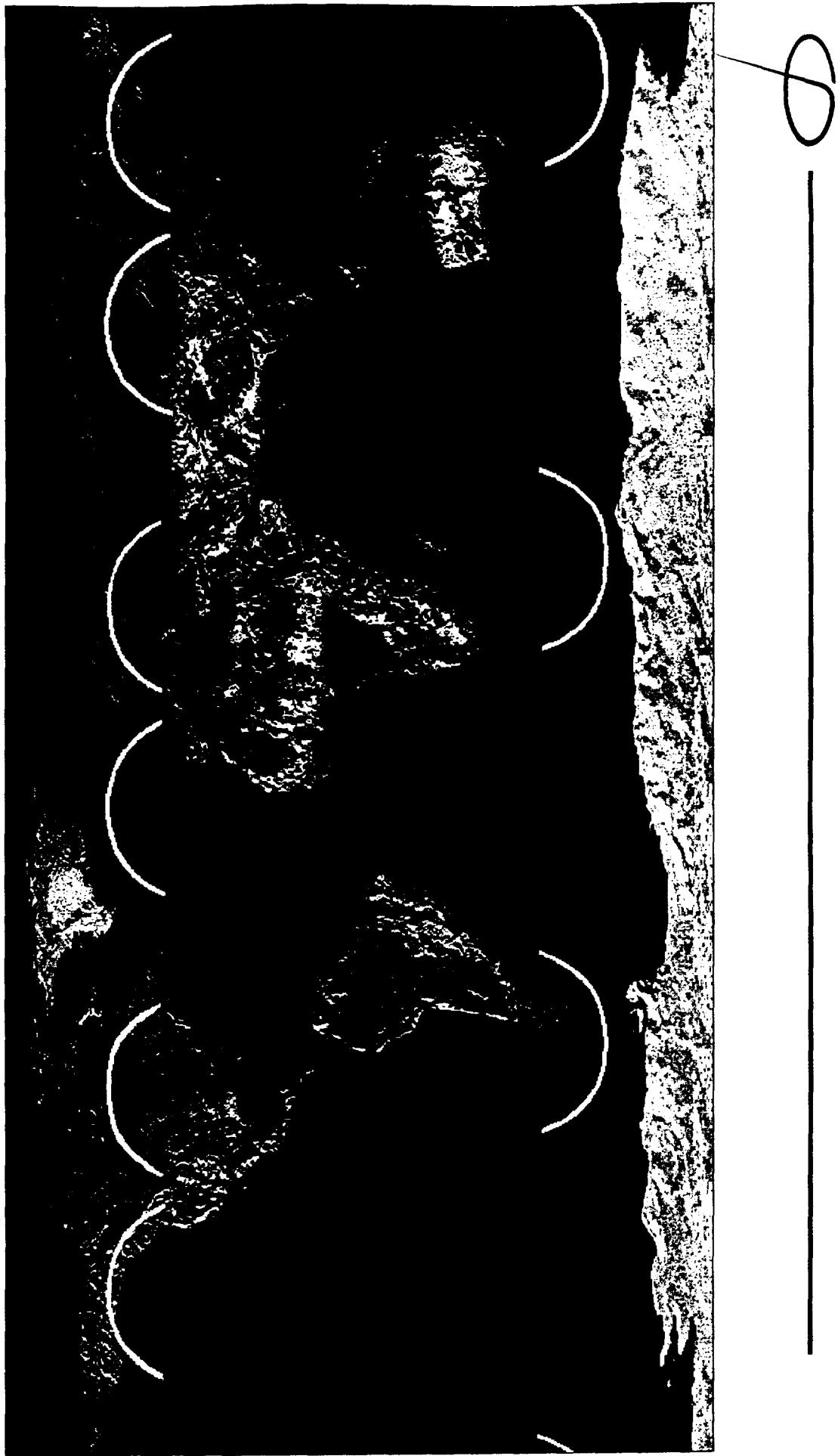


Virtual Geo Active Arcs

- One satellite active in each active arc at a time
- Active arc while between 17,500 and 27,300 km altitude
- 4 hours and 48 minutes spent in active arc per 8 hour revolution
- Active arcs fixed over important markets
- 6 in Northern Hemisphere and 3 in Southern



The Virtual Geo Active Arcs



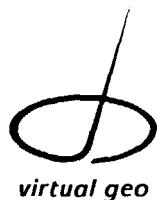
Virtual Geo Satellites

- **Payload**
 - **User link antennas**
 - Active phased array compensating for altitude and movement to maintain beam footprint fixed on earth.
 - Distributed SSPAs/LNAs
 - Single Beams
 - *28 full time beams (or larger number of part time beams)*
 - *2.25° Beamwidth*
 - *38 dBi peak gain nominal*
 - *Individually steerable and spatially hopppable*
 - *G/T: 7.2 – 10.2 dB/K*
 - Multibeams
 - *Synthesizes area beam from multiple individual beams*
 - *Coverage continuously maintained over target area*

User Terminals

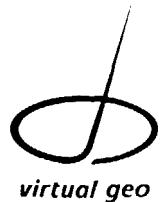
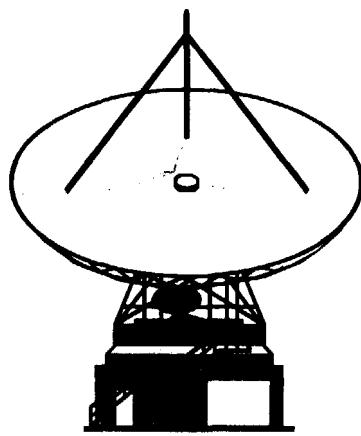
- Three types

- Virtual Geo-A: Consumer
 - 18" phased array tracking antenna, instantaneous switching
 - Weatherproof integrated housing
 - Ethernet interface: up to 10 Mbps
- Virtual Geo-B Commercial
 - 1 meter antenna
 - Higher data rates: up to 40 Mbps
- Virtual Geo-C Service Hub
 - 2 meter antenna
 - Multiaccess, Diversity capable
 - 100 Mbps and higher



Virtual Geo Gateway Terminals

- 4 per regional service area
- Each with 2 five-meter tracking antennas
- Connected by terrestrial links to the RNCC and SOCC



Virtual Geo RNCC's and SOCC

- **Regional Network Control Centers**
 - Three total
 - Two northern
 - One southern
 - Manages resource allocation and billing
 - One designated as Master at any given time.
- **Spacecraft Operations Control Center**
 - Single plus one backup
 - Connected to RNCCs and all TTC stations
 - Perform all spacecraft control and monitoring for VIRGO



Virtual Geo Capacity

- ***Forward***

- 14.25 MHz available per region
- Supports 10 – 12 Gbps for Individual Beam Service per region
- 90 – 108 Gbps globally

- ***Return***

- Individual User Beam Service only
- 7.0 GHz available per region
- Supports 5 – 6 Gbps/region
- 45 – 54 Gbps globally

Virtual Geo User Terminal

Frequencies

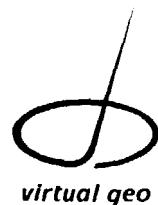
	Frequencies	Bandwidth Available
Uplink	14.0 – 14.5 GHz	500 MHz each polarization 1,000 MHz total
Downlink	11.2 – 12.7 GHz	1,500 MHz each polarization 3,000 MHz total

Virtual Geo Gateway Frequencies

	Frequencies	Bandwidth Available
Uplink	5.925 – 6.725 GHz	2,000 MHz each polarization 4,000 MHz total
	12.75 – 13.25	
	13.8 – 14.0	
	17.3 – 17.8	
Downlink	10.7 – 11.2	1,000 MHz each polarization 2,000 MHz total
	3.7 – 4.2	

Virtual Geo Frequency Reuse

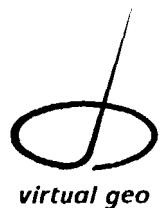
- User Link
 - 14 times per satellite
 - 28 beams
 - 1 in 4 frequency spatial reuse
 - 1 in 2 polarization reuse
 - 126 times over system (9 arcs times 14 per arc)
 - Beam array uses 1 in 4 frequency reuse pattern in both directions



Virtual Geo Frequency Re-use

- **Feeder Link**

- 8 times per satellite
 - 4 beams
 - 1 in 1 frequency spatial reuse
 - 1 in 2 polarization reuse
- 72 times over system (9 arcs times 8 per arc)

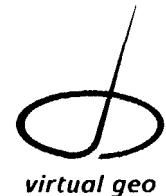
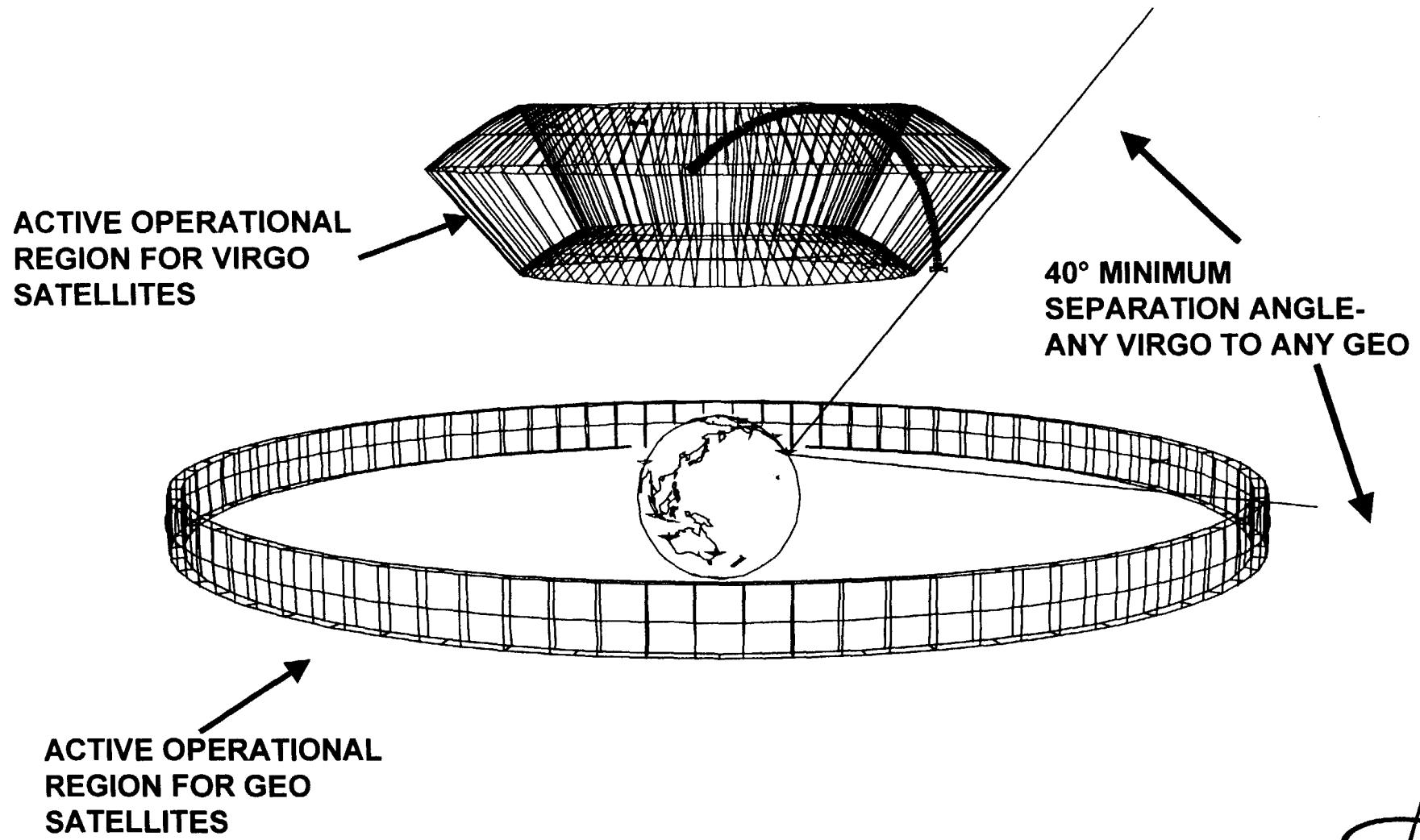


virtual geo

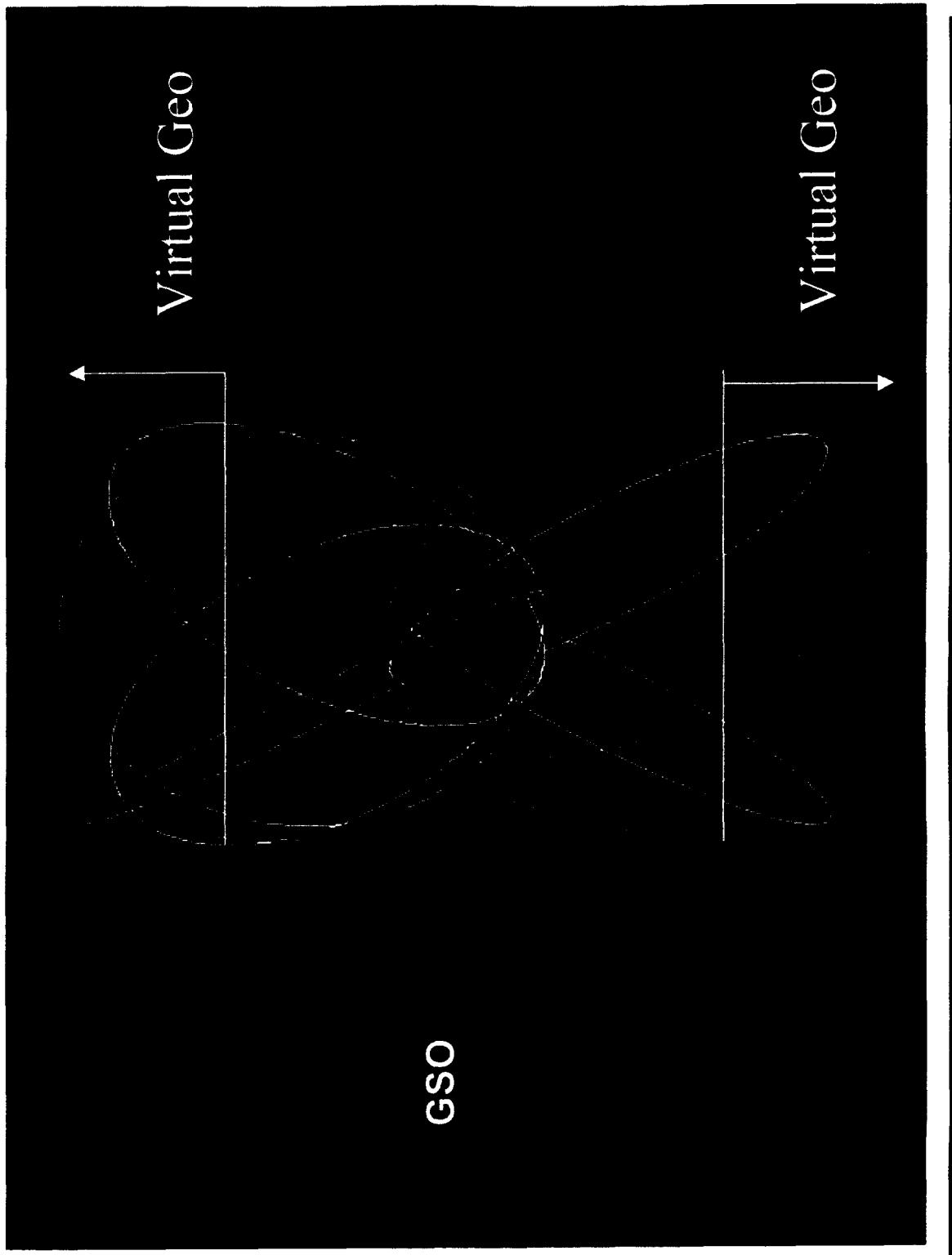
Virtual Geo and Band Sharing

Virtual Geo and Band Sharing

Comparison of Virtual Geo and GSO Operating Regions



Virtual Geo versus GSO



Geostationary Arc Separation

- Actually always more than 45 degrees
- Guarantee always more than 40 degrees
- Lowest for terminals at far North and far South latitudes
- Always > 50 degrees in Continental U.S.

Relative GSO Arc Protection Factors

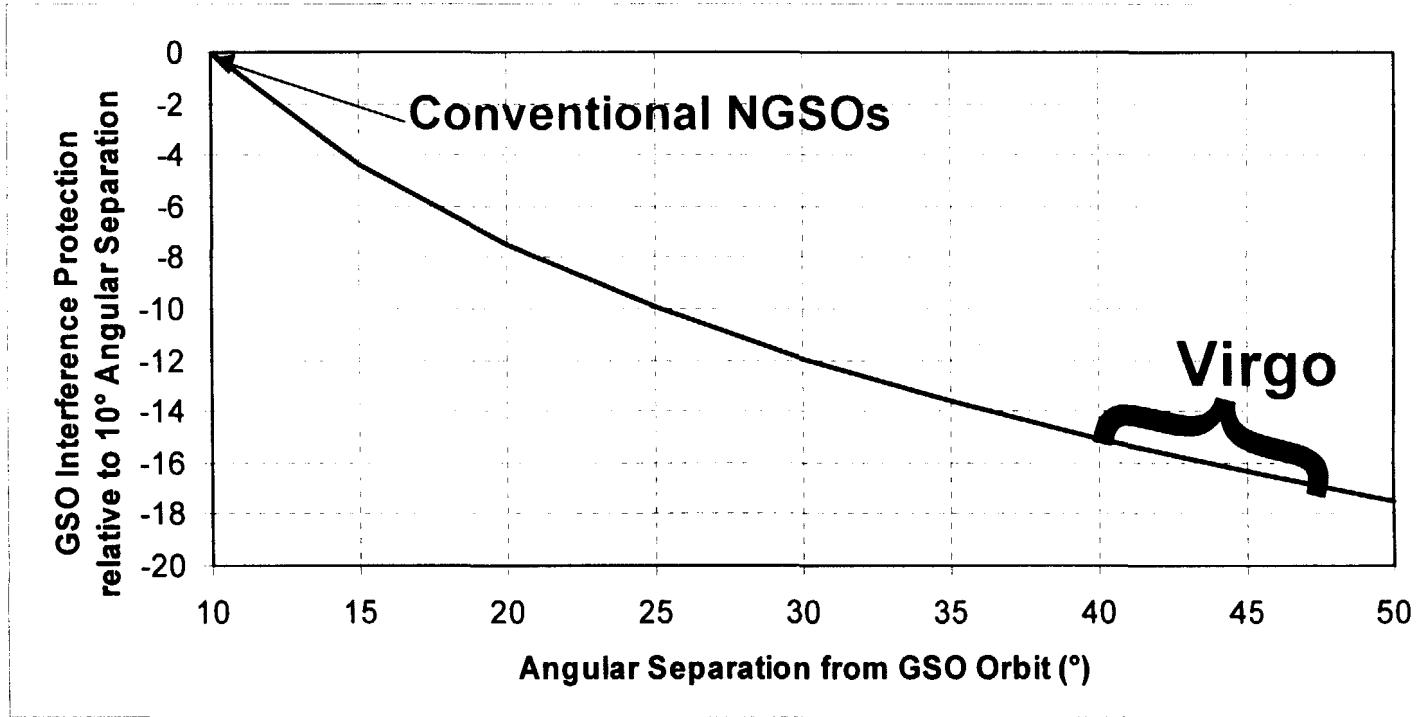


Chart based upon $25\log\Theta$ rolloff

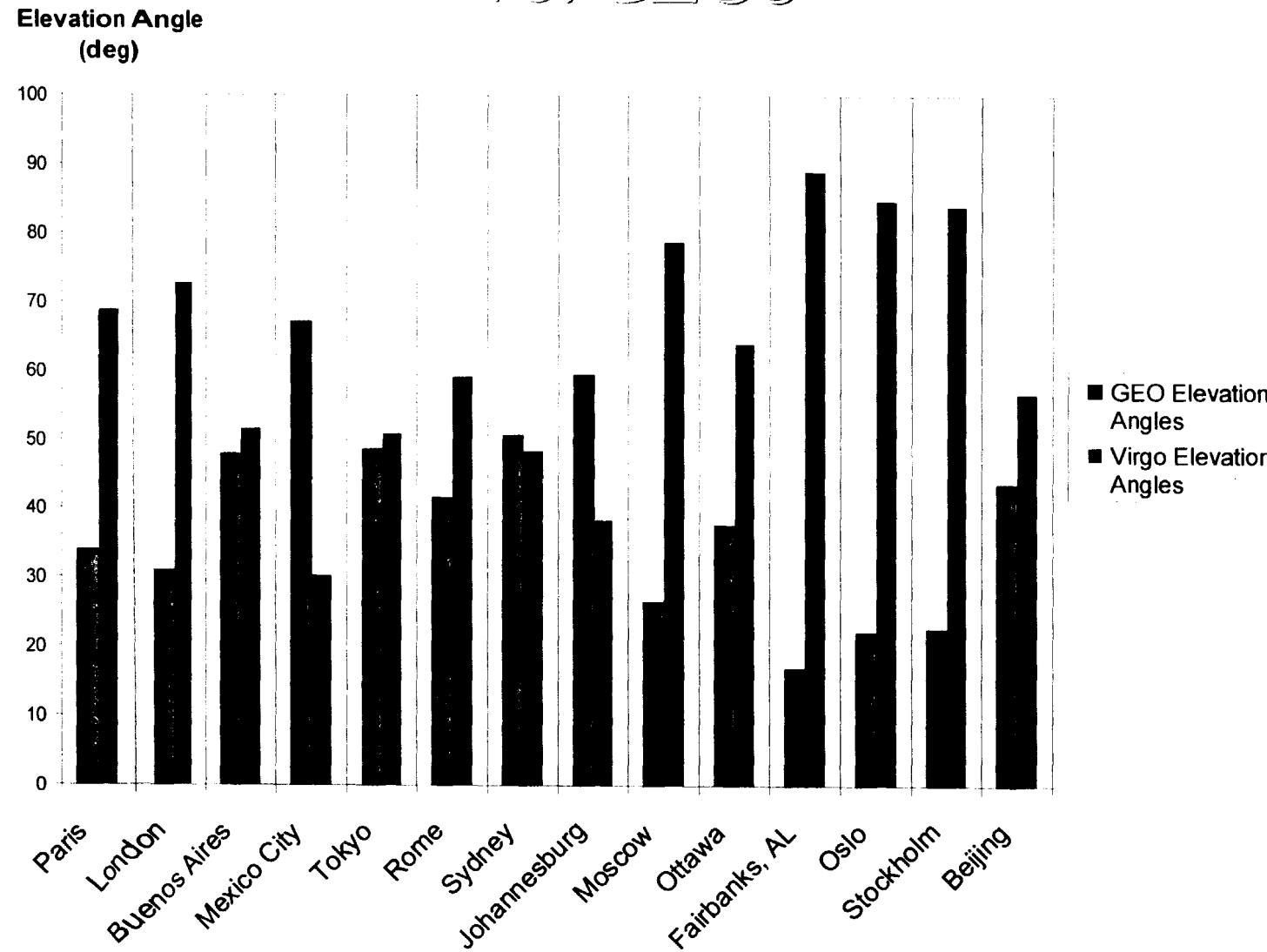
Virtual Geo Coverage and Protection to FS

- **Coverage optimized over land masses**

	Improvement Factor*
– US Coverage	
• <i>Always > 42 degrees in CONUS</i>	23 dB
• <i>>30 degrees for VI, PR</i>	19 dB
• <i>>35 degrees for Hawaii</i>	21 dB
– Global Coverage: - Elevation Angles	
• <i>Exceed 30 degrees for 50% of land areas</i>	19 dB
• <i>Exceed 20 degrees for 90% of land areas</i>	15 dB
• <i>Exceed 10 degrees for 99.9% of coverage area</i>	8 dB
– Lowest elevation angles occur off land over Atlantic, Indian, and Pacific Oceans	

* Relative to 5° minimum elevation angle

VIRTUAL GEO ELEVATION ANGLES VS. GEOS

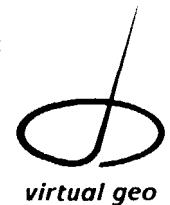


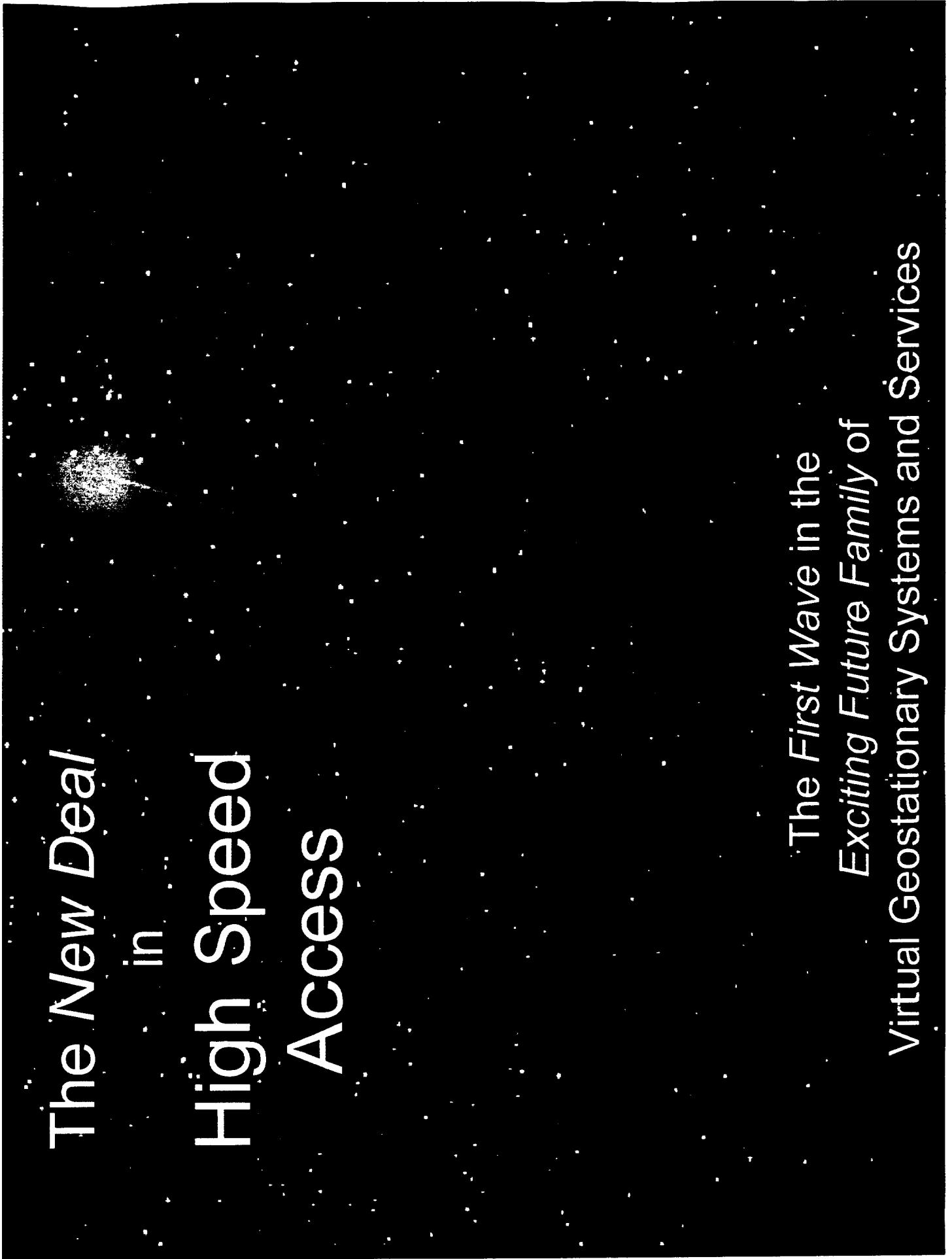
NGSO-NGOS Interference

- Uncoordinated NGSO orbits frequently cross each other's tracks
- Crossing causes co-linear interference events
- Avoided by Uniform adoption of non-crossing orbit design
- Only elliptical, active arc type orbits (e.g. Virgo) feature
 - Global Coverage
 - Non-crossing active arcs
 - Excellent GSO separation

Satellites can be slot-assigned in V-GEO tracks just as in the GSO arc

Scores, perhaps hundreds of new assignments are possible





The New Deal in High Speed Access

*The First Wave in the
Exciting Future Family of
Virtual Geostationary Systems and Services*

**For Further Information
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